

## SEQUENCE LISTING

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<120> METHOD FOR PRODUCING L-AMINO ACID USING BACTERIA  
BELONGING TO THE GENUS ESCHERICHIA

<130> OP1148

<140>

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<150> RU 2001103865

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<150> RU 2001104998

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<150> RU 2001104999

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<150> RU 2001117633

<151> 2001-06-28

<160> 16

<170> PatentIn Ver. 2.0

<210> 1

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 1

ggtctagaca atcgtaagc gtacac

26

<210> 2

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 2

ccggatccga tatagtaacg acagtg

26

<210> 3

<211> 738

<212> DNA

<213> Escherichia coli

<220>

<221> CDS

<222> (1)..(735)

<400> 3

atg gaa agc cct act cca cag cct gct cct ggt tgc gcg acc ttc atg 48

Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met

1 5 10 15

gaa gga tgc aaa gac agt tta ccg att gtt att agt tat att ccg gtg 96

Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val

20 25 30

gcc ttt gcg ttc ggt ctg aat gcg acc cgt ctg gga ttc tct cct ctc 144

Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu

35 40 45

gaa agc gtt ttt ttc tcc tgc atc att tat gca ggc gcg agc cag ttc 192

Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe

50 55 60

gtc att acc gcg atg ctg gca gcc ggg agt agt ttg tgg att gct gca 240

Val	Ile	Thr	Ala	Met	Leu	Ala	Ala	Gly	Ser	Ser	Leu	Trp	Ile	Ala	Ala	
65					70				75					80		
ctg	acc	gtc	atg	gca	atg	gat	gtt	cgc	cat	gtg	ttg	tat	ggc	ccg	tca	288
Leu	Thr	Val	Met	Ala	Met	Asp	Val	Arg	His	Val	Leu	Tyr	Gly	Pro	Ser	
			85					90					95			
ctg	cgt	agc	cgt	att	att	cag	cgt	ctg	caa	aaa	tgc	aaa	acc	gcc	ctg	336
Leu	Arg	Ser	Arg	Ile	Ile	Gln	Arg	Leu	Gln	Lys	Ser	Lys	Thr	Ala	Leu	
			100					105					110			
tgg	gcg	ttt	ggc	ctg	acg	gat	gag	gtt	ttt	gcc	gcc	gca	acc	gca	aaa	384
Trp	Ala	Phe	Gly	Leu	Thr	Asp	Glu	Val	Phe	Ala	Ala	Ala	Thr	Ala	Lys	
			115				120					125				
ctg	gta	cgc	aat	aat	cgc	cgc	tgg	agc	gag	aac	tgg	atg	atc	ggc	att	432
Leu	Val	Arg	Asn	Asn	Arg	Arg	Trp	Ser	Glu	Asn	Trp	Met	Ile	Gly	Ile	
			130				135					140				
gcc	ttc	agt	tca	tgg	tca	tgc	tgg	gta	ttt	ggc	acg	gta	ata	ggg	gca	480
Ala	Phe	Ser	Ser	Trp	Ser	Ser	Trp	Val	Phe	Gly	Thr	Val	Ile	Gly	Ala	
			145				150				155			160		
ttc	tcc	ggc	agc	ggc	tgc	ctg	caa	ggc	tat	ccc	gcc	gtt	gaa	gct	gca	528
Phe	Ser	Gly	Ser	Gly	Leu	Leu	Gln	Gly	Tyr	Pro	Ala	Val	Glu	Ala	Ala	
			165					170				175				
tta	ggc	ttt	atg	ctt	ccg	gca	ctc	ttt	atg	agt	ttc	ctg	ctc	gcc	tct	576
Leu	Gly	Phe	Met	Leu	Pro	Ala	Leu	Phe	Met	Ser	Phe	Leu	Leu	Ala	Ser	
			180					185				190				
ttc	cag	cgc	aaa	caa	tct	ctt	tgc	gtt	acc	gca	gcg	tta	gtt	ggc	gcc	624
Phe	Gln	Arg	Lys	Gln	Ser	Leu	Cys	Val	Thr	Ala	Ala	Leu	Val	Gly	Ala	
			195				200					205				
ctt	gca	ggc	gta	acg	cta	ttt	tct	att	ccc	gtc	gcc	att	ctg	gca	ggc	672
Leu	Ala	Gly	Val	Thr	Leu	Phe	Ser	Ile	Pro	Val	Ala	Ile	Leu	Ala	Gly	
			210				215					220				
att	gtc	tgt	ggc	tgc	ctc	act	gcg	tta	atc	cag	gca	ttc	tgg	caa	gga	720
Ile	Val	Cys	Gly	Cys	Leu	Thr	Ala	Leu	Ile	Gln	Ala	Phe	Trp	Gln	Gly	
			225				230				235			240		
gcg	ccc	gat	gag	cta	tga											738
Ala	Pro	Asp	Glu	Leu												
			245													

&lt;210&gt; 4

&lt;211&gt; 245

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 4

Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met  
 1 5 10 15  
 Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val  
 20 25 30  
 Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu  
 35 40 45  
 Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe  
 50 55 60  
 Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala  
 65 70 75 80  
 Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser  
 85 90 95  
 Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu  
 100 105 110  
 Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Ala Thr Ala Lys  
 115 120 125  
 Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile  
 130 135 140  
 Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala  
 145 150 155 160  
 Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala  
 165 170 175  
 Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser  
 180 185 190  
 Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala  
 195 200 205  
 Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly  
 210 215 220  
 Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly  
 225 230 235 240  
 Ala Pro Asp Glu Leu  
 245

&lt;210&gt; 5

&lt;211&gt; 336

&lt;212&gt; DNA

&lt;213&gt; Escherichia coli

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1).. (333)

&lt;400&gt; 5

atg agc tat gag gtt ctg ctg ctt ggg tta cta gtt ggc gtg gcg aat	48
Met Ser Tyr Glu Val Leu Leu Leu Gly Leu Leu Val Gly Val Ala Asn	
1 5 10 15	
tat tgc ttc cgc tat ttg ccg ctg cgc ctg cgt gtg ggt aat gcc cgc	96
Tyr Cys Phe Arg Tyr Leu Pro Leu Arg Leu Arg Val Gly Asn Ala Arg	
20 25 30	
cca acc aaa cgt ggc gcg gta ggt att ttg ctc gac acc att ggc atc	144
Pro Thr Lys Arg Gly Ala Val Gly Ile Leu Leu Asp Thr Ile Gly Ile	
35 40 45	
gcc tcg ata tgc gct ctg ctg gtt gtc tct acc gca cca gaa gtg atg	192
Ala Ser Ile Cys Ala Leu Leu Val Val Ser Thr Ala Pro Glu Val Met	
50 55 60	
cac gat aca cgc cgt ttc gtg ccc acg ctg gtc ggc ttc gcg gta ctg	240
His Asp Thr Arg Arg Phe Val Pro Thr Leu Val Gly Phe Ala Val Leu	
65 70 75 80	
ggg gcc agt ttc tat aaa aca cgc agc att atc atc cca aca ctg ctt	288
Gly Ala Ser Phe Tyr Lys Thr Arg Ser Ile Ile Ile Pro Thr Leu Leu	
85 90 95	
agt gcg ctg gcc tat ggg ctc gcc tgg aaa gtg atg gcg att ata taa	336
Ser Ala Leu Ala Tyr Gly Leu Ala Trp Lys Val Met Ala Ile Ile	
100 105 110	

&lt;210&gt; 6

&lt;211&gt; 111

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 6

Met Ser Tyr Glu Val Leu Leu Leu Gly Leu Leu Val Gly Val Ala Asn	
1 5 10 15	
Tyr Cys Phe Arg Tyr Leu Pro Leu Arg Leu Arg Val Gly Asn Ala Arg	
20 25 30	
Pro Thr Lys Arg Gly Ala Val Gly Ile Leu Leu Asp Thr Ile Gly Ile	
35 40 45	
Ala Ser Ile Cys Ala Leu Leu Val Val Ser Thr Ala Pro Glu Val Met	
50 55 60	
His Asp Thr Arg Arg Phe Val Pro Thr Leu Val Gly Phe Ala Val Leu	
65 70 75 80	
Gly Ala Ser Phe Tyr Lys Thr Arg Ser Ile Ile Ile Pro Thr Leu Leu	

	85	90	95
Ser	Ala	Leu	Ala
Tyr	Gly	Leu	Ala
Trp	Lys	Val	Met
Ala	Ile	Ile	
100	105	110	

&lt;210&gt; 7

&lt;211&gt; 37

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence:primer

&lt;400&gt; 7

cctttggtac cagatctgcg ggcagtgagc gcaacgc

37

&lt;210&gt; 8

&lt;211&gt; 34

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence:primer

&lt;400&gt; 8

ctgtttctag atcctgtgtg aaattgttat ccgc

34

&lt;210&gt; 9

&lt;211&gt; 28

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence:primer

&lt;400&gt; 9

ggctagata tggctaacaat tatccggc

28

&lt;210&gt; 10

&lt;211&gt; 28

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence:primer

&lt;400&gt; 10

ccggatccaa acggagcatg gcagctcc

28

&lt;210&gt; 11

&lt;211&gt; 648

&lt;212&gt; DNA

&lt;213&gt; Escherichia coli

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(645)

&lt;400&gt; 11

gtg att cag acc ttt ttt gat ttt ccc gtt tac ttc aaa ttt ttc atc	48
Met Ile Gln Thr Phe Phe Asp Phe Pro Val Tyr Phe Lys Phe Phe Ile	
1 5 10 15	
ggg tta ttt gcg ctg gtc aac ccg gta ggg att att ccc gtc ttt atc	96
Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile	
20 25 30	
agc atg acc agt tat cag aca gcg gca gcg cga aac aaa act aac ctt	144
Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu	
35 40 45	
aca gcc aac ctg tct gtg gcc att atc ttg tgg atc tcg ctt ttt ctc	192
Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu	
50 55 60	
ggc gac acg att cta caa ctt ttt ggt ata tca att gat tcg ttc cgt	240
Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg	
65 70 75 80	
atc gcc ggg ggt atc ctg gtg gtg aca ata gcg atg tcg atg atc agc	288
Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser	
85 90 95	
ggc aag ctt ggc gag gat aaa cag aac aag caa gaa aaa tca gaa acc	336
Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr	
100 105 110	
gcg gta cgt gaa agc att ggt gtg gtg cca ctg gcg ttg ccg ttg atg	384
Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met	
115 120 125	

gcg ggg cca ggg gcg atc agt tct acc atc gtc tgg ggt acg cgt tat 432  
 Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr  
 130 135 140  
 cac agc att agc tat ctg ttt ggt ttc ttt gtg gct att gca ttg ttc 480  
 His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe  
 145 150 155 160  
 gct tta tgt tgt tgg gga ttg ttc cgc atg gca ccg tgg ctg gta cgg 528  
 Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg  
 165 170 175  
 gtt tta cgc cag acc ggc atc aac gtg att acg cgt att atg ggg cta 576  
 Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu  
 180 185 190  
 ttg ctg atg gca ttg ggg att gaa ttt atc gtt act ggt att aag ggg 624  
 Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly  
 195 200 205  
 att ttc ccc ggc ctg ctt aat taa 648  
 Ile Phe Pro Gly Leu Leu Asn  
 210 215

<210> 12

<211> 215

<212> PRT

<213> Escherichia coli

<400> 12

Met Ile Gln Thr Phe Phe Asp Phe Pro Val Tyr Phe Lys Phe Phe Ile  
 1 5 10 15  
 Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile  
 20 25 30  
 Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu  
 35 40 45  
 Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu  
 50 55 60  
 Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg  
 65 70 75 80  
 Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser  
 85 90 95  
 Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr  
 100 105 110  
 Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met  
 115 120 125



Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr  
 130 135 140  
 His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe  
 145 150 155 160  
 Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg  
 165 170 175  
 Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu  
 180 185 190  
 Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly  
 195 200 205  
 Ile Phe Pro Gly Leu Leu Asn  
 210 215

<210> 13

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 13

ggctctagagt ccgcggcaat tatcaggg

28

<210> 14

<211> 29

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 14

ccagatctgg tagttgtgac gctaccggg

29

<210> 15

<211> 594

<212> DNA

<213> Escherichia coli

<220>

&lt;221&gt; CDS

&lt;222&gt; (1).. (591)

&lt;400&gt; 15

atg aat gaa atc att tct gca gca gtt tta ttg atc ctg att atg gat	48
Met Asn Glu Ile Ile Ser Ala Ala Val Leu Leu Ile Leu Ile Met Asp	
1 5 10 15	
ccg ctc gga aac cta cct att ttc atg tcc gta ctg aaa cat act gaa	96
Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu	
20 25 30	
ccg aaa aga cgg cgg gca atc atg gtg cga gag ttg ctt att gct ctc	144
Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu	
35 40 45	
ctg gtg atg ctg gtg ttc ctg ttt gcg ggt gag aaa att ctg gca ttt	192
Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe	
50 55 60	
ctt agc cta cga gca gaa acc gtc tcc att tct ggc ggc atc att ctg	240
Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu	
65 70 75 80	
ttt ctg atc gcc att aaa atg att ttc ccc agc gct tca gga aat agc	288
Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser	
85 90 95	
agc ggg ctt ccg gca ggt gaa gag cca ttt atc gtg ccg ttg gca att	336
Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile	
100 105 110	
ccg tta gtc gcc ggg ccg act att ctc gcc acg ctg atg ttg ttg tct	384
Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser	
115 120 125	
cat cag tac ccg aat cag atg ggg cat ctg gtg att gct ctg ctg ctg	432
His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu	
130 135 140	
gcc tgg ggc ggc acc ttt gtc atc ctg cta cag tct tcg cta ttt tta	480
Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu	
145 150 155 160	
cgt ctg ctg ggc gag aaa ggg gtg aac gca ctt gaa cgc ctg atg gga	528
Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly	
165 170 175	
ttg att ctg gtg atg atg gca acc cag atg ttc ctc gac ggc att cga	576
Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg	
180 185 190	

atg tgg atg aag ggg taa

594

Met Trp Met Lys Gly

195

<210> 16

<211> 197

<212> PRT

<213> Escherichia coli

<400> 16

Met Asn Glu Ile Ile Ser Ala Ala Val Leu Leu Ile Leu Ile Met Asp

1

5

10

15

Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu

20

25

30

Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu

35

40

45

Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe

50

55

60

Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu

65

70

75

80

Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser

85

90

95

Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile

100

105

110

Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser

115

120

125

His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu

130

135

140

Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu

145

150

155

160

Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly

165

170

175

Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg

180

185

190

Met Trp Met Lys Gly

195